

AMENDMENTS TO THE CLAIMS

Claims 1-25. (Canceled)

26. (Currently Amended) A method of forming a diode comprising the steps of: providing an original substrate not doped with anode and cathode regions; forming an anode of a first conductivity type and a cathode of a second conductivity type disposed below said anode on said original substrate without removing any portion of said original substrate and without replacing with another substrate material, wherein at least one of said cathode and anode comprise a plurality of vertically abutting diffusion regions; [[and]] forming a plurality of isolation regions in said original substrate, said cathode and anode being disposed between adjacent ones of said plurality of isolation regions, said plurality of isolation regions extending deeper into said original substrate than said cathode and said anode; and forming a plurality of isolation structures in said original substrate, each of said plurality of isolation structures disposed between at least a portion of said anode and respective said adjacent ones of said plurality of isolation regions, said plurality of isolation structures extend to a depth less than said cathode.
27. (Original) The method as recited in claim 26, wherein said isolation regions comprise a plurality of insulation-filled trenches having sidewalls that are substantially vertical.
28. (Original) The method as recited in claim 26, wherein said isolation regions comprise a plurality of insulation-filled trenches having sidewalls that are tapered.
29. (Previously Presented) The method as recited in claim 26, wherein said step of forming said cathode comprises:
forming a first doped region of a second conductivity type abutting said anode; and
forming a second doped region of said second conductivity type abutting and disposed below said first doped region and contacting said original substrate, said first and second doped regions having different dopant concentrations.

30. (Canceled)
31. (Previously Presented) The method as recited in claim 26, wherein said isolation regions are formed by a process comprising the steps of:
etching said original substrate to form trenches;
depositing at least one insulator; and
removing portions of said insulator outside of said trenches.
32. (Previously Presented) The method as recited in claim 31, wherein said step of depositing comprises deposition of a fill material.
33. (Previously Presented) The method as recited in claim 29, wherein said step of forming said cathode further comprises the step of forming a third doped region disposed between said first doped region and said second doped region.
34. (Original) The method as recited in claim 33, wherein said third doped region comprises a retrograde-doped region.
35. (Previously Presented) The method as recited in claim 26, wherein said step of forming said anode comprises the steps of:
forming a first doped region abutting said cathode; and
forming a second doped region on a surface of said original substrate, said second doped region having a higher concentration of dopant than said first doped region.
36. (Original) The method as recited in claim 35, wherein said first doped region comprises a retrograde-doped region.
37. (Previously Presented) The method as recited in claim 35, further comprising the steps of:
forming a plurality of diffusion regions of said second conductivity type on a surface of said original substrate.

38. (Previously Presented) The method as recited in claim 37, further comprising the step of: forming a plurality of second isolation regions that separate said plurality of diffusion regions from said cathode.
39. (Previously Presented) The method as recited in claim 26, wherein said cathode is in electrical contact with said original substrate.
40. (Previously Presented) The method as recited in claim 26, wherein said cathode is disposed entirely below said anode.
41. (Previously Presented) The method as recited in claim 26, wherein a junction formed between said anode and said cathode is bounded by said adjacent ones of said plurality of isolation regions.
42. (Previously Presented) The method as recited in claim 26, wherein said original substrate comprises a single crystal material.
43. (Canceled)
44. (New) The method as recited in claim 26, wherein said step of forming said anode and a step of forming a doped region for a transistor in another region of said original substrate occur substantially simultaneously.
45. (New) The method as recited in claim 44, wherein said step of forming said anode comprises ion implanting into said original substrate to substantially simultaneously form said anode and a source/drain for said transistor, or epitaxially growing a layer on said original substrate to substantially simultaneously form said anode and a base region for said transistor.

46. (New) The method as recited in claim 26, wherein said step of forming said cathode and a step of forming a doped region for a transistor in another region of said original substrate occur substantially simultaneously.
47. (New) The method as recited in claim 46, wherein said step of forming said cathode comprises ion implanting into said original substrate to substantially simultaneously form said cathode and a subcollector for said transistor, or epitaxially growing a layer on said original substrate to substantially simultaneously form said cathode and said doped region for said transistor.